

CLAIMS

1 1. A method of positioning a selected recording channel on a
2 recording head relative to an optical servo system in a
3 read/write assembly comprises:

4 positioning the optical servo system at a first position
5 relative to the selected recording channel in the read/write
6 assembly;

7 processing an alignment tape in the read/write assembly
8 to determine a lateral offset between the optical servo system
9 and the selected recording channel; and

10 positioning the optical servo system at a second position
11 relative to the selected recording channel using the lateral
12 offset.

1 2. The method of claim 1 wherein the alignment tape includes
2 a track of longitudinal equally spaced apart alignment voids.

1 3. The method of claim 2 wherein processing comprises:

2 writing a track of data to the alignment tape over the
3 track of alignment voids;

4 imaging a section of the alignment tape to determine a
5 lateral distance between a center of the track of alignment
6 voids and a center of the track of data; and

7 setting the lateral offset to the lateral distance.

1 4. The method of claim 3 wherein imaging comprises placing
2 the section of alignment tape under a Magnetic Force
3 microscope.

1 5. The method of claim 3 wherein imaging comprises placing
2 the section of alignment tape under an optical microscope
3 using ferrofluid.

1 6. The method of claim 3 wherein the lateral distance is
2 measured in micrometers (μm) .

1 7. The method of claim 1 wherein the second position is
2 laterally upward from the first position if the lateral offset
3 is a negative number.

1 8. The method of claim 1 wherein the second position is
2 laterally downward from the first position if the lateral
3 offset is a positive number.

1 9. The method of claim 3 wherein imaging further comprises:
2 determining an average lateral distance between several
3 alignment voids and the track of data; and
4 setting the lateral offset to the average lateral
5 distance.

- 1 10. The method of claim 2 wherein processing comprises:
- 2 writing and subsequently reading a track of data to a
- 3 front major surface of the alignment tape on the track of
- 4 alignment voids with a write head and a read head of the
- 5 selected recording channel;
- 6 monitoring a bit-error ratio (BER) from reading the track
- 7 of data; and
- 8 correlating the bit-error ratio (BER) to the lateral
- 9 offset.
- 1 11. The method of claim 10 wherein correlating comprises
- 2 relating a maximum BER to the lateral offset.
- 1 12. The method of claim 11 wherein a negative lateral offset
- 2 value indicates the optical servo system is laterally above
- 3 the selected recording channel.
- 1 13. The method of claim 11 wherein a positive lateral offset
- 2 indicates the optical servo system is laterally below the
- 3 selected recording channel.
- 1 14. The method of claim 10 wherein the BER represents a
- 2 number of erroneous data bits read divided by the total number
- 3 of data bits written.

1 15. The method of claim 2 wherein processing comprises:
2 providing a plurality of longitudinally arranged equally
3 spaced apart alignment void tracks on the alignment tape;
4 moving the recording head across the tracks in a motion
5 perpendicular to a motion of the alignment tape;
6 writing and reading a magnetic signal to the alignment
7 tape by the selected recording channel at a higher frequency
8 than the frequency of alignment voids moving past the selected
9 recording channel to determine an amplitude demodulated
10 magnetic signal;
11 directing a beam of light by the optical servo system to
12 the alignment tape to determine an optical signal; and
13 determining a timing difference between the envelope of
14 the demodulated magnetic signal and the envelope of the
15 optical signal.

1 16. The method of claim 15 wherein determining comprises the
2 timing difference between a peak in the envelope of the
3 demodulated magnetic signal and a peak in the envelope of the
4 optical signal.

1 17. The method of claim 15 wherein determining comprises
2 calibrating the timing difference using the velocity measured

3 from the timing difference between peaks in the envelope of
4 the optical signal.

1 18. The method of claim 15 wherein determining comprises the
2 cross-correlation function to find the timing difference
3 between the envelope of the demodulated magnetic signal and
4 the envelope of the optical signal.

1 19. The method of claim 17 wherein the velocity is determined
2 from the separation of peaks in the cross-correlation
3 function.

1 20. The method of claim 16 wherein the lateral offset is set
2 equal to the timing difference divided by the velocity.

1 21. The method of claim 2 wherein processing comprises:
2 providing a plurality of longitudinally arranged equally
3 spaced apart alignment void tracks on the alignment tape;
4 moving the recording head across the tracks in a motion
5 perpendicular to a motion of the alignment tape;
6 directing multiple beams of light by the optical servo
7 system to the alignment tape to determine a number of optical
8 signals; and
9 determining a timing difference between the envelope of
10 one optical signal and the envelope of another optical signal.

1 22. The method of claim 21 wherein the optics are rotated to
2 bring the timing difference divided by the velocity to a
3 desired value.

1 23. The method of claim 21 wherein determining comprises the
2 cross-correlation function to find the timing difference
3 between the envelope of one optical signal and the envelope of
4 another optical signal.

1 24. The method of claim 1 wherein the alignment tape
2 comprises:

3 a plurality of longitudinal tracks on a second major
4 surface of the tape; and
5 recording channel positioning alignment voids.

1 25. The method of claim 24 wherein processing comprises:
2 suspending the alignment tape in a coupon;
3 positioning the alignment tape with the coupon over a
4 recording channel pair to position a line from one element of
5 a channel pair to another; and
6 positioning the optical servo system such that one
7 generated optical spot is centered on a middle one of the
8 longitudinal tracks and other generated optical spots are
9 offset by a desired amount.

1 26. The method of claim 24 wherein the plurality of tracks
2 are generated by passing the tape through a laser system.

1 27. The method of claim 25 wherein positioning comprises:
2 viewing the alignment tape under a microscope; and
3 adjusting the alignment tape's position with a precision
4 translation and rotation stage attached to the coupon.

1 28. An alignment tape for positioning a selected recording
2 channel of a recording head relative to an optical servo
3 system in a read/write assembly comprises:
4 an elongated continuous web of flexible plastic substrate
5 material having two edges and defining a front major surface
6 and a back major surface;
7 a magnetic storage medium formed on the front major
8 surface;
9 an inert medium formed on the back major surface; and
10 a track of alignment voids for indicating actual lateral
11 displacement of the selected recording channel relative to the
12 optical servo system.

1 29. The tape of claim 28 wherein the track of alignment voids
2 is formed by ablation by a pulsating laser beam of sufficient
3 power to penetrate the back major surface through to the front

4 major surface leaving visible the flexible plastic substrate
5 of the alignment tape.

1 30. A method of positioning a selected recording channel on a
2 recording head relative to an optical servo system comprises:

3 fixedly positioning the optical servo system at a
4 position relative to the selected recording channel;

5 processing an alignment tape to determine a lateral
6 offset between the optical servo system and the selected
7 recording channel; and

8 storing the lateral offset.

1 31. The method of claim 30 further comprising aligning a data
2 track with the selected recording channel using optical servo
3 system and the stored lateral offset during tape travel across
4 the selected recording channel.